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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,751	03/04/2004	Kazuo Tomita	402992	5267
23548	7590	06/27/2005	EXAMINER	
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			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/791,751

Applicant(s)

TOMITA ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2005.
2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 12 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1 - 12 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 04 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/2/05.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on April 8, 2005 has been received and entered in the case.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following limitation in claim 9 "vias in the low-k dielectric film and in the cap film" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

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be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 4 – 8, 11 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Dirahoui et al. (U. S. Pat. No. 6,492,259).

Regarding claim 1, Dirahoui et al. discloses in e.g., Fig. 8 an interconnecting structure comprising:

- first wirings (12 and 14; column 4, lines 2 and 3) supported by a substrate (10; column 3, line 60);
- a low-k dielectric film (SOG 22; column 4, lines 47 – 50) on the first wirings, the low-k dielectric film having a dielectric constant not exceeding 3 (k is approximately 2.7 – see column 3, line 55 of Aoyama et al. U. S. Pat. No. 6,765,297);
- vias (26'; column 4, line 54) in a first portion of the low-k dielectric film and connected to the first wiring (12; see e.g., Fig. 8);
- second wirings (28; column 5, line 5 and column 2, lines 27) in a second portion, further from the substrate than the first portion, of the low-k dielectric film (22), on the vias (26'), and connected to the vias (26'; see e.g., Fig. 8); and

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- dummy vias (24; column 4, lines 32 – 33) in the first portion of the low-k dielectric film (22) and on the periphery of an isolated via of the vias (26'; see e.g., Fig. 8).

Regarding claim 4, Dirahoui et al. discloses in e.g., Fig. 8 the dummy vias having a slit shape (see e.g., Fig. 8).

Regarding claims 5 and 7, Dirahoui et al. discloses in e.g., Fig. 8 the dummy vias (24) having an approximate dimension of a diameter that is similar as the diameter of non-dummy vias (26'). Thus, Dirahoui et al. discloses in e.g., Fig. 8 the dummy vias having a dimension 1 time of one of the dimensions of the vias.

Regarding claim 6, Dirahoui et al. discloses in e.g., Fig. 8 the vias (26') extending only in the first portion of the low-k dielectric film (22), and the dummy vias (24) extend through both the first and second portions of the low-k dielectric film (24) and do not contact the first wirings (12 or 14; see e.g., Fig. 8).

Regarding claims 8 and 12, Dirahoui et al. discloses in e.g., Fig. 8 all of the first wirings, the vias, the second wirings, and the dummy vias having a damascene structure (column 3, lines 36 – 39 and column 4, lines 29 – 32).

Regarding claim 11, Dirahoui et al. discloses in e.g., Fig. 8 an interconnecting structure comprising:

- first wirings (12 and 14) supported by a substrate (10);
- a low-k dielectric film (22) on the first wirings, the low-k dielectric film having a dielectric constant not exceeding 3;
- vias (26') in the low-k dielectric film and connected to the first wiring (see e.g. Fig. 8);

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- second wirings (28) on the vias (26') and connected to the vias (26'; see e.g., Fig. 8), the second wiring having a surface coplanar with a surface of the low-k dielectric film (22; see e.g., Fig. 8); and
- dummy vias (24) on the periphery of an isolated via of the vias (see e.g., Fig. 8).

5. Claims 9 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Hagihara (JP 2001-168093 and U. S. Pat. No. 6,570,243: The Japanese publication is the basis for the rejection under 102(b). For the understanding, the U.S. reference will be cited as needed.).

Regarding claim 9, Hagihara discloses in e.g., Fig. 1(e) and Fig. 2 an interconnecting structure comprising:

- first wirings (the first wiring layer in the inner pattern region; column 6, lines 33 – 35) supported by a substrate (1);
- a low-k dielectric film (SOG film 5; column 6, line 42) on the first wirings, the low-k dielectric film having a dielectric constant not exceeding 3 (k is approximately 2.3 – see column 1, lines 29 – 32 of Tsuji et al. U. S. Pat. No. 6,818,570);
- a cap film (6; column 6, line 43) on the low-dielectric film (5; see e.g., Fig. 1(e) and column 6, lines 50 – 52);
- vias (the via holes at elements forming region; column 6, lines 53 – 56) in the low-k dielectric film and in the cap film, the vias being connected to the first wiring;
- second wirings (the second wiring layer in the inner pattern region; column 7, lines 1 – 4) on the vias and connected to the vias, the second wiring having a surface (at the

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- bottom surface of the second wirings e.g., the bottom surface of the elements 8)
- coplanar with a surface of the cap film (top surface of the cap film 6); and
- dummy vias (7 in Fig. 1(C); column 5, lines 55 – 57) on the periphery of an isolated via of the vias.

Regarding claim 10, the limitation “all of the first wirings, the vias, the second wirings, and the dummy vias have a damascene structure” is product by process claim limitation. Even though product-by-process claim is limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted). A “product by process” claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 116; In re Wertheim, 191 USPQ 90 (209 USPQ 254 does not deal with this issue); and In re Marosi et al., 218 USPQ 289 final product per se which must be determined in a “product by, all of” claim, and not the patentability of the process, and that an old or obvious product, whether claimed in “product by process” claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dirahoui et al. in view of Lui et al. (U. S. Pat. No. 6,582,974).

While Dirahoui et al. discloses the use of the second wirings, Dirahoui et al. does not disclose a cap film on the low-k dielectric film. Lui et al. teaches in e.g., Fig. 6 a cap film (22a', 22b' and 22b'') on a low-k dielectric film (20a', 20b' and 20b''); column 7, lines 44 – 59), wherein second wiring (32a) is in the cap film (22a', 22b' and 22b'') and the low-k dielectric film (20a', 20b' and 20b''); see Fig. 6). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the cap film of Lui et al on the low-k dielectric film of Dirahoui et al. as taught by Lui et al. (1) to provide an etch stop and planarizing stop layer (column 8, lines 10 and 11) and (2) to prevent damage to the underlying metal lines (column 6, lines 4 – 6 of Yang et al.).

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dirahoui et al. in view of Sugiyama et al. (U. S. Pat. No. 6,486,558).

Dirahoui et al. discloses in e.g., Fig. 8 further comprising:

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- first dummy wirings (since the wirings 18 are connected to the dummy vias 24, the wiring 18 read as first dummy wirings) on the periphery of the first wirings (12 and 14; see e.g., Fig. 8); and
- second dummy wirings (the wirings on top of the elements 24 that are formed by a repeated process of the layer 22 on top of the layer 22; column 6, lines 39 and 40) on the periphery of the second wirings (28), wherein the dummy vias (24) are connected to the first and second dummy wirings (column 6, lines 39 and 40).

However, Dirahoui et al. does not disclose one of the first and second dummy wirings connected to the dummy vias being connected to ground potential. Sugiyama et al. teaches in e.g., Fig. 7 one of a first (102 in the layer 88) and second (102 in the layer 90) dummy wirings connected to dummy vias (106) being connected to ground potential (column 7, lines 11 – 13). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Dirahoui et al. by applying the ground potential of Sugiyama et al. into the structure of Dirahoui et al. as taught by Sugiyama et al. The ordinary artisan would have been motivated to modify Dirahoui et al. in the manner described above for at least the purpose of electrically connecting the dummy wirings to the ground terminal of the substrate to stabilize capacitance (column 7, lines 65 – 67).

Response to Arguments

9. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

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Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c.
Monday, June 20, 2005


GEORGE ECKERT
PRIMARY EXAMINER